Cleanup Levels and Risk Calculations under the Model Toxics Control Act Cleanup Regulation

CLARC

Version 3.1

Washington State Department of Ecology
Toxics Cleanup Program

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Introduction

Overview

Cleanup Levels and Risk Calculations (CLARC) is a compendium of technical information related to the calculation of cleanup levels under the Model Toxics Control Act (MTCA) Cleanup Regulation, Chapter 173-340 WAC. The Washington State Department of Ecology (Ecology) has compiled and calculated this technical information to assist the user in the development of cleanup levels at a site. As emphasized below, the formula values pre-calculated under standard Method B and standard Method C and provided in CLARC are **NOT cleanup levels**. The use of CLARC is not sufficient to establish cleanup levels. The following discussion provides an overview of the contents of this document.

- **Part I** provides an overview of the methods for establishing cleanup levels and guidance on the development of cleanup standards for each of the different media – ground water, surface water, soil and air.

- **Part II** includes several memos and tables that provide background information for the Method A values for potable ground water (Table 720-1), unrestricted soil (Table 740-1), and industrial soil (Table 745-1). These memos and tables were previously published as Appendix D to the Concise Explanatory Statement for the Amendments to the MTCA Cleanup Regulation (February 12, 2001).

- **Part III** includes several tables that provide pre-calculated standard Method B and standard Method C formula values for each of the different media (ground water, surface water, soil and air) and pathways using the equations and default values set forth in the regulation. CLARC does not provide pre-calculated values for petroleum mixtures (see Part IV).

  Part III also includes tables that list the applicable criteria under state and federal laws (ARARs) for potable ground water and surface water.

  Part III also includes several tables that provide default values for various chemical-specific parameters. These parameters include the toxicological properties of a chemical (e.g., cancer potency factors, reference doses, and bioconcentration factors), as well as the physical and chemical properties of a chemical (e.g., soil organic carbon-water partitioning coefficient, distribution coefficient, Henry's law constant, and solubility).

- **Part IV** provides an overview of the process for establishing Method B and Method C cleanup levels for petroleum mixtures. CLARC does not provide pre-calculated formula values for petroleum mixtures because the calculation depends on the composition of a mixture that must be determined on a site-specific basis. Part IV does provide the default chemical-specific reference doses for the constituents of a petroleum mixture.

- **Part V** provides important background information for each of the tables in Part III.

Caution on Use of CLARC

The requirements and procedures for establishing cleanup levels that are protective of human health and the environment are specified in the MTCA Cleanup Regulation, chapter 173-340 WAC. The use of CLARC is not sufficient to establish cleanup levels under the regulation.

Use of Formula Values as Cleanup Levels: The formula values pre-calculated under standard Method B and C and provided in CLARC are **NOT cleanup levels**. The formula values **DO NOT**, for example, account for the following:

- Consideration of applicable state and federal laws (for all media);
- Consideration of surface water impacts (for ground water);
- Consideration of ecological impacts (for surface water and soil);
- Consideration of the residual saturation limit for protection of ground water (for soil)
- Consideration of the vapor pathway (for soil);
- Consideration of the lower explosive limit limitation (for air);
- Consideration of natural background concentrations (for all media);
- Consideration of the practical quantitation limit (for all media);
- Consideration of the NAPL limitation (for surface water and ground water);
- Consideration of total site risk (for all media);

The department may also establish cleanup levels that are more stringent than those required under the applicable method when the department determines, based on a site-specific evaluation, that such levels are necessary to protect human health and the environment.

Limitations of CLARC

- **Modified Method B and C (Site-Specific Risk Assessment)**

  CLARC does not provide pre-calculated formula values for modified Method B or C. The calculation of modified Method B or C values requires the use of site-specific and/or chemical-specific values instead of the default values provided in the regulation.

- **Soil – Direct Contact Pathway – Concurrent Exposure (Ingestion and Dermal Contact)**

  For petroleum mixtures, the standard Method B and C formula values are based on concurrent exposure (ingestion and dermal contact). CLARC does not provide pre-calculated standard Method B or C formula values for petroleum mixtures, including values based on the direct contact pathway (see discussion below).

  For hazardous substances other than petroleum mixtures, the standard Method B and C formula values are based on ingestion only. CLARC does provide pre-calculated standard Method B and C formula values for those substances.

  For hazardous substances other than petroleum mixtures, evaluation of concurrent exposure (ingestion and dermal contact) is only required under modified Method B and C and then only under certain specified circumstances. The regulation provides standard equations and default values for evaluating concurrent exposure. CLARC does not provide pre-calculated Method B or C formula values using those standard equations and default values.

- **Petroleum Mixtures**

  CLARC does not provide pre-calculated standard Method B or C formula values for petroleum mixtures. The calculation of standard Method B and C formula values for petroleum mixtures depends on the composition of a mixture. The composition must be determined on a site-specific basis.

- **Ammonia**

  CLARC does not provide pre-calculated standard Method B or C formula values for ammonia. The calculation of standard Method B and C formula values depends on the water quality characteristics (temperature and pH) and the chemical form/species of ammonia (e.g., ionized or non-ionized).

- **Asbestos**

  CLARC does not provide pre-calculated standard Method B or C formula values for asbestos. The calculation of standard Method B and C formula values depends on the fiber type and content. Note that the metric for asbestos is based on fiber type and is usually expressed as fibers/L and not as the usual mg/L or ug/L metric.

❖ **Chromium**

CLARC does not provide pre-calculated standard Method B or C formula values for total chromium. CLARC does provide pre-calculated standard Method B and C formula values for chromium III and chromium VI.

Assessors should test for total chromium first and then test for chromium VI only if the concentration for total chromium exceeds the cleanup level for chromium VI.

- If chromium VI is present at the site, then the concentration of chromium III is determined by subtracting the chromium VI concentration from the total chromium concentration.
- If chromium VI is NOT present at the site, then the site assessor may assume that the measured concentration of total chromium is the concentration of chromium III.

Of course, if there is documented evidence that chromium VI was never used at the site, then the site assessor does not need to test for chromium VI and may assume that the measured concentration of total chromium is the concentration of chromium III.

❖ **Lead**

CLARC does not provide pre-calculated standard Method B or C formula values for lead. Values for lead cannot be calculated using the equations provided in the regulation. Assessors should consult with the Department of Ecology regarding the use of EPA's Integrated Exposure Uptake Biokinetic (IEUBK) model to calculate soil cleanup levels.

❖ **Manganese**

CLARC provides pre-calculated standard Method B or C formula values for manganese. The formula value for manganese depends on the reference dose (RfD). The reference dose was obtained from the U.S. Environmental Protection Agency's Integrated Risk Information System (IRIS), but was not modified as recommended by the EPA. The recommended modification depends on the route of exposure. EPA recommends that a modifying factor of "1" should be used when assessing exposure from food and that a modifying factor of "3" should be used when assessing exposure from drinking water or soil. This modification factor is based on the increased exposure of children to manganese-contaminated water and soil. Please consult IRIS for a more complete description of the basis for the modification factors. As noted, the RfD for manganese listed in CLARC and used to pre-calculate the formula values for standard Method B and C has not been adjusted. If the modifying factor of "3" for manganese is used, then the formula values for standard Method B and C for soil and ground water would be one-third the value presented in CLARC.

Versions

Version 2.0 of CLARC (or CLARC II) was published in February 1996.

Version 3.0 of CLARC was published in August 2001 and includes changes based on the amendments to the MTCA Cleanup Regulation, chapter 173-340 WAC, adopted on February 12, 2001. Version 3.0 superceded Version 2.0.

Version 3.1 of CLARC was published in November 2001 and includes corrections to Version 3.0. These corrections are noted in the enclosed Modification History. Version 3.1 supercedes Version 3.0.

Ecology expects to periodically update CLARC to provide additional technical information. Users of CLARC should contact the Toxics Cleanup Program at (360) 407-7170 or check the program's web site at http://www.ecy.wa.gov/programs/tcp/cleanup.html to ensure that they have the most recent version.